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ABSTRACT

Designed to assist training staff in the planning and implementation of training for older workers, this guide indicates: the main problem areas; the extent and importance of the various requirements; some industrial experience in dealing with such problems; and some further resources of information on particular aspects of training of adults. The principal factors affecting the success or failure of the plan are: the design of training which takes account of the organizational problems peculiar to adults with their established attitudes and conventions; and the choice of training methods within this pattern which take account of their age and previous experience and enable them to learn most effectively. Appendixes include problems of learning for the adult and sources of further information. (Author/EB)

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RE-TRAINING OF OLDER WORKERS

IRON AND STEEL
INDUSTRY
TRAINING BOARD

APRIL 1970

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RE-TRAINING

OF OLDER

WORKERS

(A consideration of some problems associated with training older workers)

Iron and Steel Industry Training Board
4 Little Essex Street, London, W.C.2.
APRIL 1970

Objectives

The guide is issued in order to assist in the planning and implementing of training for older workers. It does not purport to be a comprehensive manual of procedures and practices for planning and implementing training schemes, but aims to indicate:—

(i) the main problem areas which need to be considered;

(ii) the extent and importance of the various requirements;

(iii) some experience, albeit limited, gained by the Industry in dealing with such problems, and

(iv) some further sources of information on particular aspects of training of adults.

The guide is designed for use by training staff and others who will be involved in planning and implementing the training and who will be concerned with its results.

Introduction

The present rate of innovation in this and other industries has, and is, producing the need for personnel of all levels and all occupations to learn new skills or new methods of working at more frequent intervals in their careers. In some cases these changes are small or evolve over a period of time so giving people time to adapt and develop with the change. Other changes have been more rapid and it has been necessary for large numbers of people to learn new working habits in a short period of time.

In this Industry, in addition to the initial training of older recruits, the principal areas of re-training are likely to arise from :—

(a) **Changes associated with employment agreements**
These agreements, often reached as a result of some form of productivity bargaining, have usually meant a re-organisation of the manning pattern and the need for people to be able to perform wider ranges of tasks. This kind of change has been particularly noted amongst maintenance personnel where agreements have enabled craftsmen to undertake duties not traditionally assigned to them.

(b) **Changes in plant**
The installation of new plant may mean a restructuring of the manning pattern but almost certainly involves the performance of new tasks. From the training point of view it will probably imply a large number of personnel being trained over a comparatively short period of time.

Clearly in both these circumstances and their variations many of the people involved will be older than the age normally associated with training, and they may have developed attitudes and habits and hold concepts which may militate against the acceptance of new ideas.

The task of helping people to make the necessary changes effectively and quickly is part of the responsibility of those involved in industrial training. A proportion of such a task will form an organisation problem involving liaison and agreement between the various interests concerned as part of the normal course of establishing an effective working environment.

Much of this work requires expertise belonging to other functions, but this paper concentrates on those problems peculiar to the training function. This may represent an artificial division which in practice does not exist, as in most cases the development of effective training will require to proceed hand-in-glove with other needs. Therefore, whilst purely training problems are discussed in this paper they will need to be considered along with these other needs.

Training requirements- early considerations

Arising from changes associated with employment agreements or changes in plant and methods of operation, there are several considerations which are peculiar to the training function and which need to be examined at a very early stage in the planning and implementing of an industrial project leading to the re-training of adults.

The major requirements are:—

(a) information on methods of manning, of procedures and methods of operation and all the other information required for constructing training programmes;

(b) suitable personnel qualified in these procedures or the operation of the plant to act as instructors;

(c) opportunities for re-trained personnel to gain practical operating experience on the plant before it is finally commissioned;

(d) suitable aids and simulators which may be required during training;

(e) suitable premises or space to carry out training;

(f) for training time to be incorporated as an "activity" in the development programme of the project;

(g) an early check on any further education facilities which might be required and consultation with the relevant authorities.

Some of these requirements can possibly only be satisfied by co-operation with the contractors installing the plant and it has been found that where this is necessary such provisions should form part of the contract.

In some cases, another works may have the same or similar plant in operation and it will be possible to arrange for visits, attachments or the loan of instructors.

Developing a training system

An approach for developing a training system to cope with the needs generated for either the installation of new plant or the re-organisation for manning structure will be:—

(a) **Determine Training Priorities**
The manning structure and the relationships between jobs will be examined to establish orders of priority for training. In particular, some jobs will form key areas where unsatisfactory performance could create widespread delays elsewhere. It is on these areas the training effort will be initially concentrated. In particular, with new plant there will be the need to examine the programme of construction to determine the sequence in which parts of the plant are likely to be completed.

(b) **Analyse the Jobs**
The analysis will involve the listing of the responsibilities and duties and any particular skills or knowledge required by these duties. Consideration should also be given to the environment within which the job functions, to identify further training requirements, e.g. communication with other jobs and functions.
In the case of new plant, the information upon which this analysis is based will need to be provided by the manufacturers or obtained by co-operation with another works using similar plant.

(c) **Identify the Standards of Performance Required**
This can be a particularly difficult area, but it will be necessary to pay attention to the minimum standard of performance which will be acceptable following training. Such standards will be required in order to compare them with the trainees' present abilities; to give the instructors identifiable "targets" and to assist in the evaluation of the effectiveness of the training.

(d) **Compare Job Needs with Trainees' Ability**
The abilities at present possessed by the trainees should be compared with the needs of the job to establish training needs; this is particularly important with regard to levels of background knowledge. For example, in training a mechanical fitter to undertake a certain amount of electrical work, it will be necessary to decide on the amount of theoretical electrical knowledge the man already possesses compared with the needs of the job.
The results of these comparisons will indicate the actual training required.

(e) **Develop Training Schemes**
To fulfill the identified needs, the subject matter should be arranged into groups of topics. To create optimum learning situations each training item should be allotted to a group on the grounds of being educationally or technically related.
Decisions will need to be made on the proportion of training covered by off-the-job courses, either in-company or externally. For in-company courses, it will be necessary to generate training programmes which indicate where plant will be required and the proportion of time to be devoted to off-the-job training as opposed to at-the-job or on-the-job training.

(f) **Choose Instructors and Methods of Training**
Closely related, and affecting decisions made in (e) above, instructors will need to be chosen in the light of the training method used, the location of the training, the aids available and the subject matter to be taught.

The chart below lists examples of the constraints in items of Human Factors and Facilities which may operate at the principal stages in the development process.

Stages in the Process	Human Factors	Facilities
Identify training needs.	Type of work to be performed. Trainees' current level of performance and previous working experience. Attitudes. Selection Policy.	Access to information
Develop a training pattern.	Time available to train related to level and quantity of training required. Numbers and availability of instructors. Number of people to be trained.	Capacity of company training facilities. Further education and other external facilities.
Select training methods to be used.	Ability of instructors. Knowledge of adult learning patterns.	Availability of facilities for production of training materials.

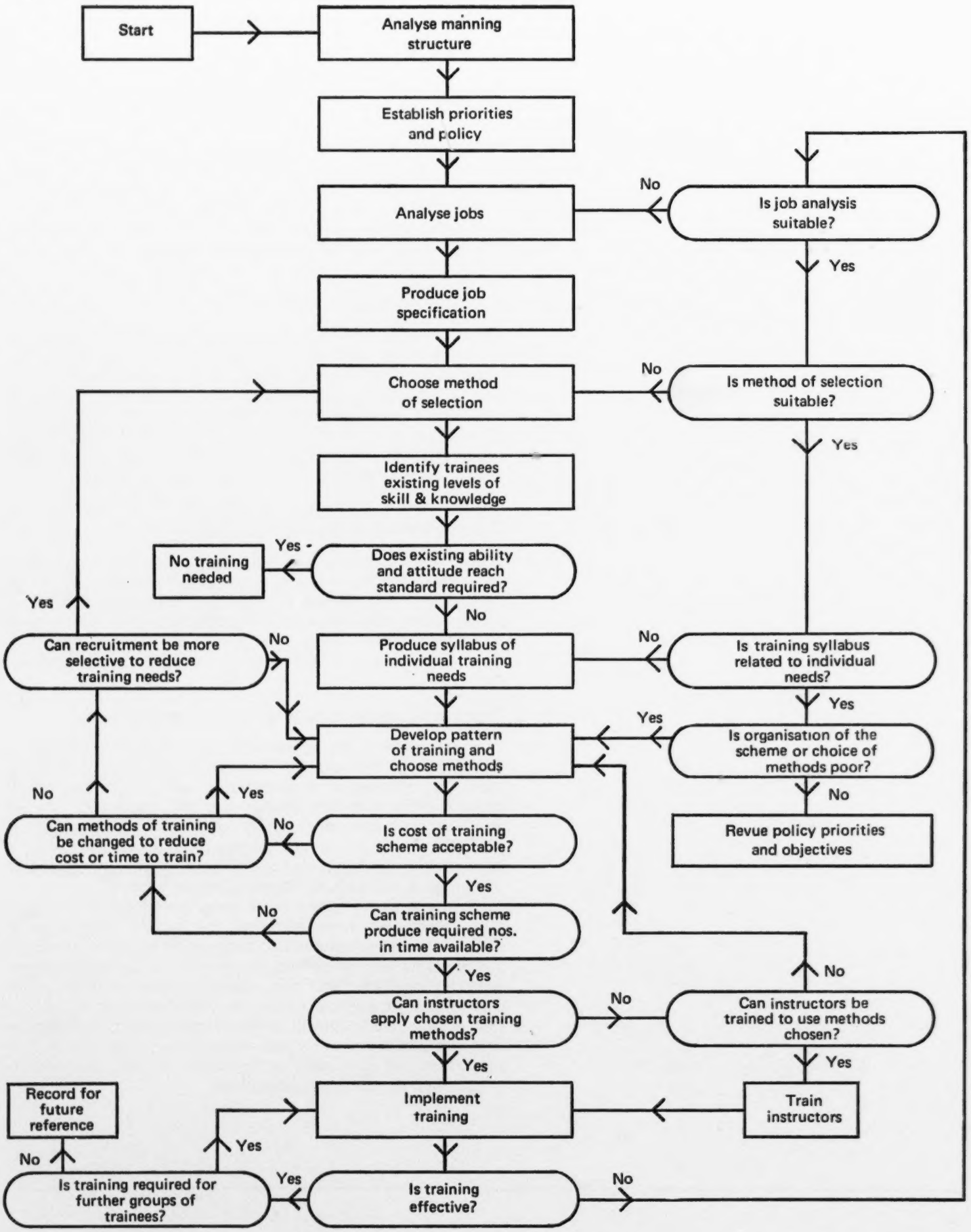
For example the ease with which training needs may be identified will depend largely on the kind of job involved and on the availability of information on the ways in which these jobs are to be carried out and their relationship to each other.

Similarly the ability of the available instructor will form a constraint on the choice of training methods.

It can therefore be seen that the resulting training pattern will need to strike a balance which takes into account these various human and organisational factors, and within such limitations allows the necessary training to proceed effectively.

Besides these influences there are the overall parameters of time and cost. The Algorithm in Figure 1 illustrates a means of checking the efficacy of the pattern of training developed, and indicates the principal areas in which modifications could be made.

Figure 1.


Start
Analyse manning structure
Establish priorities and policy
Analyse jobs
Is job analysis suitable?
No
Yes
Produce job specification
Choose method of selection
Is method of selection suitable?
No
Yes
Identify trainees existing levels of skill & knowledge
Does existing ability and attitude reach standard required?
Yes
No training needed
No
Produce syllabus of individual training needs
Is training syllabus related to individual needs?
No
Yes
Can recruitment be more selective to reduce training needs?
Yes
No
Develop pattern of training and choose methods
Is organisation of the scheme or choice of methods poor?
Yes
No
Revue policy priorities and objectives
Can methods of training be changed to reduce cost or time to train?
No
Yes
Is cost of training scheme acceptable?
No
Yes
Can training scheme produce required nos. in time available?
No
Yes
Can instructors apply chosen training methods?
No
Yes
Can instructors be trained to use methods chosen?
No
Yes
Train instructors
Implement training
Record for future reference
No
Yes
Is training required for further groups of trainees?
Yes
No
Is training effective?
Yes
No

Principal factors affecting programme construction

In following the sequence for developing a training pattern it should be noted that the actual importance or degree of effect to be attached to such constraints will require to be judged in the light of a specific situation but for adults, in particular, some aspects will need greater consideration than might be thought necessary in planning training for younger recruits.

(a) Attitude towards re-training

Many subsequent difficulties in re-training adults appear to stem from their attitude. If the people concerned are convinced that the exercise is in their best interests and they are eager for it to be successful, then many of the pitfalls will be avoided. It is, therefore, worthwhile devoting some considerable time to this aspect. Attitudes towards re-training are influenced by a range of factors but in this Industry the following have been particularly noted:—

The reasons for the re-training

Experience has shown that most of the successful schemes have been based upon a full understanding of the reasons behind the change and its implications. The earlier such reasons can be explained and the longer people concerned have to consider the implications, the more chance there is of a satisfactory situation developing.

The availability of alternative employment

The requirement for employees to undergo a period of re-training to fit them for new work may cause them to look for alternative employment where perhaps their present skills and knowledge are still accepted. In an area where alternative and suitable employment is available to a firm's employees this may well pose a considerable problem in designing and getting the trainees to accept a suitable re-training programme.
In contrast, some cases have been noted where the fact that employees were attracted by better conditions in other local firms has caused companies to enter into new agreements with their employees and to re-organise the working practices and manning structures so that better conditions of service could be introduced to stem the drift away, and to attract a higher standard of skilled men into the company. In these cases it is to be noted that length of service with a company is not particularly significant in retaining personnel.

Previous training experience

Trainees who have regularly received training from their companies seem to have found less difficulty than those for whom training has been looked upon as a once and for life activity. Clearly this situation will depend on the type of activity upon which the company is employed, but the amount and frequency of training can be an indication of the degree of difficulty likely to be met. In the next section it is suggested that in selecting people some part of the procedure should be to involve them in undergoing a small part of the training, so that they may have a first-hand impression of what is involved and of their own ability to respond.

The extent of the re-training

It appears that for older trainees long training periods are not usually successful. Adults appear to prefer being involved in the working situation as early as possible after a short intensive course.
In this Industry there has been an example of redundant foundry craftsmen being re-trained as fitters and taking two years or more to do it, but this is an exception rather than the rule.

Changes in status or seniority

An improved financial position or state of security as a result of training has always appeared at least as an initial stimulus, but a man's status in a community is also a spur. The attitude of the redundant craftsmen mentioned above may have been affected by an un-willingness to lose their status as craftsmen.

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Changes in relationships

Difficulties have been met where there is a break-up of teams or where trainees would be working with different people after training is complete. Team working situations, therefore, need special consideration and where possible it is often advisable to keep them together, particularly as post-training circumstances appear to influence older trainees to a greater extent than younger personnel. In this Industry one company took considerable care to ensure that craftsmen being re-trained were given adequate opportunity to visit their future workshop to meet and get to know their future colleagues and particularly their future supervisors. In addition, visits of these supervisors to the training centre allowed them to assess the standards of the trainees' work. It is thought that these activities generated confidence on both sides and smoothed the transition period at the end of training.

(b) Training Needs

Amongst the various elements affecting the training needs it has been found necessary to look very carefully at the minimum standard of performance that will be accepted when the man starts work.

With young trainees who are usually recruited into junior positions, it is accepted that they will gain experience and expertise and in the meantime allowances are made for slowness or clumsiness. In contrast, the older man may be training for jobs where there is an established minimum standard and where failure to reach that standard may cause the re-trained man to become unacceptable. For example, a trainee crane driver may be able to operate a crane safely and accurately but, if his performance is too slow then he will probably be unacceptable.

The training officer, in conjunction with management, should accurately identify the minimum standard of performance which will be acceptable as a result of the training, and this minimum standard should be written into the objectives so that instructors and trainees are clear as to the skill level which must be reached.

(c) Selecting Trainees

There would appear to be two aspects of selection that need to be considered:—

(i) Choosing a method that not only selects people with suitable abilities and other attributes, but is also acceptable to them or their representatives.

(ii) Ensuring that people selected are medically fit for the training and subsequent work.

The scope of this paper does not attempt a full discussion on the relative merits of the various selection techniques at present available, but information on these is obtainable. (See later for some sources of further information.)

In selecting older people, it has been found desirable that at least an element of the selection procedure should be devoted to convincing the potential trainee that he will be able to learn by the way in which he will be taught. One answer is to allow a probationary period of training, but this can be expensive and certainly time consuming. In addition, rejection after a period of time may be more disturbing for older people.

Trainability tests form an approach worth considering. These tests differ from other kinds of selection device in that they measure a trainee's ability to learn from a particular training method. Further details can be obtained from the report of a pilot study on their use (see Section 5 of this paper) in which it is suggested that such tests show a higher correlation for older workers than for younger people between performance on the test and subsequent performance on the training course. In addition, it is thought that trainability tests are more likely to be acceptable to the trainee himself, or to his representatives.

Where a man is being trained for work which requires a high level of physical fitness then clearly a medical check will need to be included in the selection procedure. It has been found to be desirable even when the present and future work are apparently very similar. Some physical defects peculiar to age may only become apparent when the trainee is faced with changes in his working pattern. The need for such a check was confirmed by several companies in this Industry, and a particular example concerned a man whose eyesight had deteriorated to such an extent that he was unable to read an unfamiliar scale although he had been reading similar but familiar scales for a number of years. In this case a simple change of glasses was all that was needed.

(d) Choice of Instructors

The age of the instructor related to that of the trainees seems less important than his attitude towards them. Most successful young instructors have gone to some trouble to get themselves accepted by the training group. Particularly when re-training skilled men, the instructors should maintain respect for the men's previous skill and maintain the attitude that these are skilled men learning additional skills. Many difficulties can be overcome by keeping the number of trainees per instructor low. Experience suggests that eight trainees to each instructor is a satisfactory ratio.

(e) Factors Which Affect Adult Learning

A training programme is a design for learning. It shows the manner in which the subject matter is to be taught, the sequence in which the items are to be taught and the proportion of time to be allotted to each syllabus item, so that optimum learning situations are created.

It is probable that no two people learn in the same way nor gain the same degree of benefit from any one training method. It is also probable that some methods are more effective in producing particular kinds of change in the majority of people than other methods.

This paper does not allow a full discussion on the various theories of learning, but it may be helpful as a background to consider the ways in which an adult's rate of learning may have changed with age.

It should be noted, however, that whilst the following remarks indicate the way in which people tend to learn or forget, an individual person may depart widely from this general tendency.

If a group of people take an objective standardised test, their scores will range from high to low. The frequency with which the scores occur can be plotted and the curve shown in Figure 2 will result. This is a curve of normal distribution and shows that a few people will obtain a very high score in area A, and a few people a very low score in area D, but the majority will lie in areas B and C.

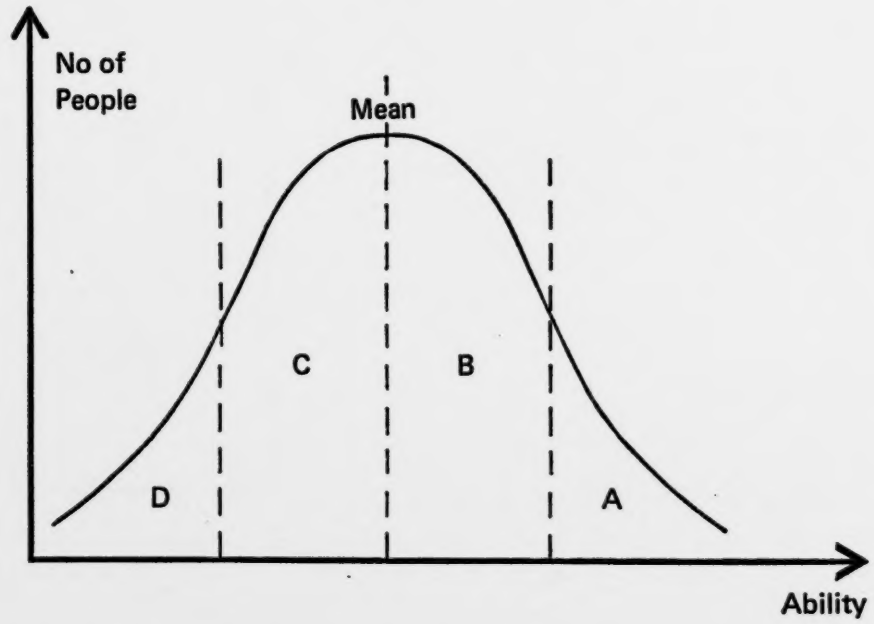

Figure 2

It has been found that the rate at which people learn new material is related to the results obtained by them on this kind of test. In this group of people, therefore, the few in area A would learn fast, the majority in area C would learn at an intermediate rate, and the very few in area D would learn extremely slowly. It is not suggested that potential trainees should therefore be tested, but that a training officer should be aware that this kind of result is likely to occur amongst a group of trainees.

As people grow older their results on these tests change and their rate of learning will change. If one person was tested at regular intervals throughout his life, the result would show a tendency to improve regularly for the first twenty years or so to a peak in the early twenties. This level would probably be maintained for a number of years, but would tend to decrease with increasing age.

This kind of change in ability with age is shown by two typical curves in Figure 3.

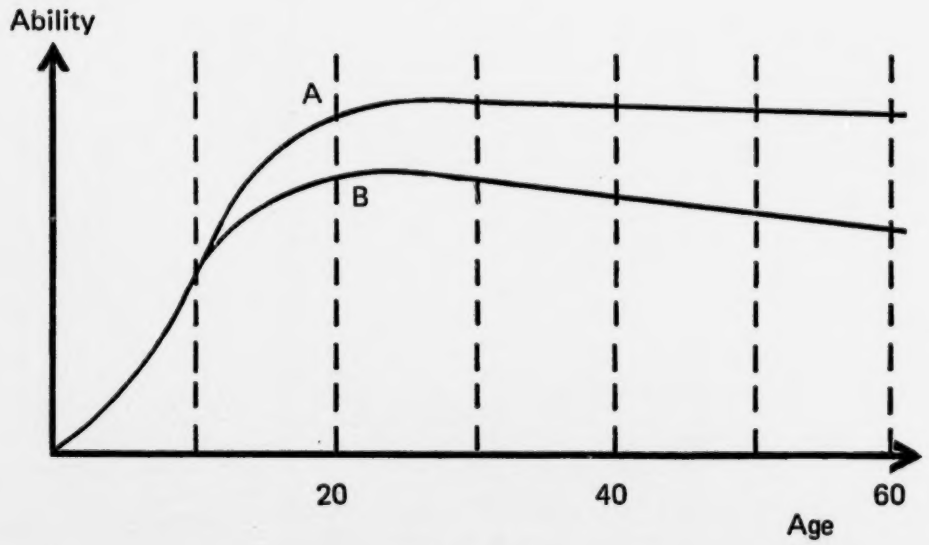

Figure 3

This diagram shows two points of interest, firstly a person (A) with the higher original score tends to maintain this throughout life. This result has been found to be particularly true where continual practice is maintained. For example, a person with high verbal ability who is employed on work involving the use of words, will tend to maintain or even increase his score in verbal ability tests.
Conversely, a person of lower ability (B) will tend to lose this ability more rapidly, but again it can be expected that continual practice of any particular skill will tend to maintain the level.

From the point of view of the Training Officer compiling a programme, the following points should be borne in mind :—

(i) In learning, people of high ability tend to learn more rapidly than those of lower ability.

(ii) Account should be taken of the past activities of the trainee; in both physical and mental skills, previous active use tends to ease the difficulties with which new skills are learnt.

(iii) People who practise a skill to a high level in youth but who subsequently go off to other work may be re-trained easily and will tend to return to their old level of skill rapidly.

Within these general comments the following specific points should be noted :—

The amount of unlearning that has to be done

"Old habits die hard" is particularly true when re-training men who have been engaged upon an activity for a number of years, and especially when the new methods may be in direct conflict with previous ideas and principles. It would seem that in planning a training programme account should be taken of the degree to which new ideas cut across the concepts and skills at present held by the trainees.

It may be necessary to plan a programme which includes some work designed specifically to condition the men's attitude towards a new method. For example, the foundry craftsmen in this Industry who were being re-trained as fitters were required to build up pieces which they considered would have been better cast and, additionally, they were asked to work to thousandths of an inch instead of the much coarser tolerances of foundry work. Until the men were able to accept the reasons for the change in the method of construction and the reasonableness of the tolerances, progress in the training was slow.

Particular attention also needs to be paid to situations in which the changes in performance required, whilst important, only appear to the trainee to be marginally different. This frequently occurs when introducing new standard operating procedures into an existing plant.

Rhythm of work

Many new plants work on a different time cycle from that of the plant replaced and men who have been engaged for a number of years on a particular rhythm of working may experience difficulty in adapting to a faster pace, e.g. the time cycle of the open hearth furnace compared with that of the new basic oxygen processes.

Methods of training presentation

Where men have been accustomed to receiving training the formal lecture room is acceptable, but the more remote the time when training was last experienced, then the more informal should be the instruction. For such people, an informal group chatting to an instructor in a comfortable corner of the room would probably be more successful than a classroom situation.

The Industrial Training Research Unit has suggested that the method used is of importance and their researches show that care should be taken to select a method which is relevant to the training needs and to the age of the trainee. Appendix I is an extract from "Training Information Paper No. 3" and summarises the principal considerations required in selecting a suitable method.

The "Discovery Method" of training mentioned in this table has been found to be particularly effective with adults who appear to prefer learning by exploring and using rather than by passively imitating. British Rail, in converting locomotive drivers from steam to diesel electric, made use of this method which proved popular and effective. In order to teach fault finding in electric locomotives a control group of trainees received normal lecture room instruction and an experimental group were given a number of small electric motors and suitable calibrated gauges which could be connected together to simulate the various arrangements in actual locomotives. In this way, the effect of various faults could be examined and diagnosed. In addition, the experimental group were given half the training time allowed to the control group, but at the end both groups were given the same written test and it was found that scores for the two groups were equal. In addition to this saving of time, it was thought that the experimental group showed a much greater interest and enthusiasm as against the more stoical approach of the lecture room group. More details of this method are contained in "Training Information Paper No. 5".

Summary

In developing a plan of action for the re-training of adults, this paper has endeavoured to indicate in two key areas the principal factors which affect the success or failure of the eventual plan.

These are seen to be :—

(i) The design of a pattern of training which takes account of the organisational problems peculiar to adults with their existing attitudes and established social and working conventions.

(ii) The choice of training methods within this pattern which take account of their age and previous experience and enable them to learn most effectively.

Any such training scheme must be judged eventually on its capacity to develop trainees to the required standards of performance in the shortest time at an acceptable cost.
If proper attention is devoted to the aspects indicated then the re-training of adults is not only feasible but can be established as part of a company's continuing pattern of training which can be seen to contribute to the development needs of the company and of the individual.

Appendix I

This table is reproduced from the Department of Employment and Productivity's booklet "Training Information Paper No. 3" "The Challenge of Change to the Adult Trainee".

Problems of learning for the adult

Difficulties increase with age	Suggestions as to how the training could be suitably adapted for the older learner.
1. When tasks involve the need for short-term memory	(a) Avoid verbal learning and the need for conscious memorising. This may often be accomplished by making use of 'cues' which guide the trainee. (b) When possible, use a method which involves learning a task as a whole. If it has to be learned in parts, these parts should be learned in cumulative stages (a, a +b, a +b +c, and so on). (c) Ensure consolidation of learning before passing on to the next task or to the next part of the same task (importance of self-testing and checking).
2. When there is "interference" from other activities or from other learning	(a) Restrict the range of activities covered in the course. (b) Employ longer learning sessions than is customary for younger trainees (i.e. not necessarily a longer overall time, but longer periods without interruption). (c) To provide variety, change the method of teaching rather than the content of the course. A change of subject matter may lead to confusion between the subjects.
3. When there is need to translate information from one medium to another	(a) Avoid the use of visual aids which necessitate a change of logic or a change in the plane of presentation. (b) If simulators or training devices are to be used, then they must be designed to enable learning to be directly related to practice.
4. When learning is abstract or unrelated to realities	(a) Present new knowledge only as a solution to a problem which is already appreciated.
5. When there is need to "un-learn" something for which the older learner has a predilection	(a) Ensure "correct" learning in the first place. This can be accomplished by designing the training around tasks of graduated difficulty.
6. When tasks are "paced"	(a) Allow the older learner to proceed at his own pace. (b) Allow him to structure his own programme within certain defined limits. (c) Aim at his beating his own targets rather than those of others.

7. As tasks become more complex	(a) Allow for learning by easy stages of increasing complexity.
8. When the trainee lacks confidence	(a) Use written instructions. (b) Avoid the use of production material too soon in the course. (c) Provide longer induction periods. Introduce the trainee very gradually both to new machinery and to new jobs. (d) Stagger the intake of trainees. (e) If possible, recruit groups of workmates. (f) Avoid formal tests. (g) Don't give formal time limits for the completion of the course.
9. When learning becomes mentally passive	(a) Use an open situation which admits discovery learning. (b) Employ meaningful material and tasks which are sufficiently challenging to an adult. (c) Avoid a blackboard and classroom situation or conditions in which trainees may in earlier years have experienced a sense of failure.

Appendix II

Sources of further information

The principal source for further information in adult training is:—

The Industrial Training Research Unit,
1 Silver Street,
CAMBRIDGE.

Members of the Unit have been responsible for much of the published work on the training of older people.

Further reading

Of the numerous articles and reports, the following have been selected as being particularly relevant as giving an intial introduction to the problems:—

Eunice Belbin	(Problems of Progress in Industry No. 15) H.M.S.O. 1964
Training the Adult Worker	This booklet presents a case study of the development of a training programme for adults. Although limited to the training of London postal workers, the study affords an insight into many of the factors which must be considered when designing such training programmes.

D. B. Newsham
The Challenge of Change to the Adult Trainee

(Training Information Paper No. 3) H.M.S.O. 1969

This booklet in the T.I.P. series, produced by the Department of Employment and Productivity, reports the results of a study comparing the labour turnover of middle-aged trainees with younger people. It suggests that amongst older workers the method of training has greater significance as an influence on their continued employment than with younger people.

B. T. Dodd
The Correctable Systems Approach Applied to Re-training of Steel Making Teams

(Programmed learning July, 1967)

This article describes the system of training used for the re-training of open hearth crews to form teams for electric steel making.

W. D. Seymour
Adult Re-training for Technological Change

(Article in The Production Engineer May, 1967)

A commentary on the courses, effects and needs of re-training adults backed by a case study of the re-training of setters of C.V.A. high speed presses at George Salter & Co. Ltd.

Sylvia Downs
Selecting the Older Trainee

(N.I.I.P. Bulletin June, 1968)

Describes a pilot study on the effectiveness of trainability tests. Although only a pilot study, the techniques of these tests are clearly described, together with the probable advantages. Further work has also been done on these tests applied to Welders.

Dr. R. M. Belbin
The Discovery Method in Training

(Training Information Paper No. 5) H.M.S.O. 1969

In this booklet, which follows the same style as previous publications in the series, Dr. Belbin describes four projects designed to assess the effectiveness of the Discovery Method.

Alec Rodger
The Seven Point Plan

(N.I.I.P. Paper No. 1)

Sets out an assessment system for use in selecting candidates for a job. The system gives a number of questions which should be asked under seven principal headings. A list of references included gives useful further reading on selection.

Institute of Personnel Management
Selection and Placement

I.P.M.

This booklet forms a practical guide to the application of well established principles of effective selection and placement.

ERIC Clearinghouse
APR 1 1971
on Adult Education